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ABSTRACT

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STRATEGIES IN READING COMPREHENSION: VIII. PICTURES, IMAGERY, AND RETARDED CHILDREN'S STORY RECALL

by

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Report from the Project on
Studies in Language and Communication Processes

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ABSTRACT

Ninety-six educable mental retardates, ages 10 to 16 years, were randomly assigned to one of four experimental conditions to listen to a 20-sentence story. Picture subjects viewed illustrations of the story, Imagery subjects were instructed to generate mental pictures of the story, Repetition Control subjects heard each sentence of the story twice, and Control subjects simply listened to the story once. Planned comparisons revealed that Picture subjects outperformed all other groups. Differences among the other conditions, age by conditions interactions, and age differences per se were not significant. A number of theoretically and practically interesting issues are discussed in the context of recent story-recall findings with normal children.

Strategies in Reading Comprehension:
VIII. Pictures, Imagery, and Retarded Children's Story Recall

The competent learner, when faced with a learning task, will usually first assess its demands, and then engage in an appropriate information-processing strategy. The retarded learner, in contrast, is a much more passive participant, often failing to think about the material in any meaningful way that will facilitate memory for its content. Brown (1974) proposed that normal-retardate learning differences can frequently be traced to the failure of retardates to engage in any strategic behavior. She offers evidence, however, that educable mentally retarded (EMR) adolescents can learn at near-normal levels when instructed in the use of a strategy to mediate their learning--a finding that is consistent with the notion that retardates suffer from a production deficiency (Flavell, 1970).

Other investigators have demonstrated that the learning of EMR subjects increases significantly when they are provided with an appropriate information-processing strategy. These studies have focused primarily on paired-associate learning, demonstrating that EMRs can improve their learning of to-be-associated items when supplied with sentence mediators (Turnure & Walsh, 1971), when provided with pictures of pairs of objects interacting (Milgram & Riedel, 1969), and when instructed to generate a mental image of interacting object pairs (Yarmey & Bowen, 1972).

Although the effects of mediational strategies have been examined with respect to the learning of arbitrary associates, little is known about the potential facilitation of retardates' recall of an actual story when a mediational strategy is introduced. As far as normal children are concerned,

experimenter-provided pictures and subject-generated imagery have both been found to improve story recall. However, whereas pictures are known to facilitate the story recall of normal children at all grade levels including kindergarten (Levin & Lesgold, Note 1), the ability to benefit from a mental imagery strategy seems to be developmental in nature. In particular, not until about third grade can normal children successfully employ an imagery strategy to improve their story recall, unless special techniques are devised (Guttmann, Levin, & Pressley, in press; Shimron, 1974). This is in contrast to the paired-associate results, where children about two or three years younger benefit from an imagery strategy (Levin, 1976). Lesgold, Levin, Shimron, and Guttmann (1975) suggest that this lag in children's ability to employ an imagery strategy (between paired-associate and story-recall tasks) may be attributed to the additional requirement of keeping track of the theme of the story, including inter-sentence relationships.

Since the story-recall task is assumed to be more complex than the paired-associate task in the Pascual-Leone (1970) sense, and since EMR children may be presumed to be less effective learners in comparison to normals, it is not appropriate to generalize across tasks and subject populations when deciding which props and strategies will facilitate EMRs' story recall. The present investigation focussed on experimenter-provided pictures and subject-generated imagery as candidates that respectively might and might not be successful. Two control groups were also employed, one to compare directly with the Picture condition, and one with the Imagery condition. In the former Repetition Control condition, subjects heard each sentence of the story twice. Such experimenter-provided repetition controls for the possibility that pictures do little more than provide

a second exposure to the story, and has been demonstrated to be helpful with normal children (Levin, Bender, & Lesgold, 1976; Ruch & Levin, in press). The latter Control group was allowed to hear the story only once and was given no special props or instructions; the initiation of any learning strategy, such as silent rehearsal, was left up to the subject.

In order to judge whether subjects were "comprehending" as well as "rotely remembering" information in the story, two types of questions were used for testing. "Verbatim" questions contained words taken verbatim out of the original passage. According to Anderson (1972), such questions can be answered by matching their surface elements with those of the original communication even in the absence of complete comprehension of the passage's content. "Paraphrase" questions, on the other hand, contained statements whose meanings were equivalent to the original statements, but were composed of synonyms of the substantive words previously used in the story. Since memory for the sound of the exact words used in the passage is not helpful, it is assumed that these questions can be answered only if the passage was understood.

Ruch and Levin (in press) and Peng (Note 2) found that experimenter-provided pictures facilitated normal second- and third-grade children's recall of both verbatim- and paraphrase-cued story information. Interestingly, however, Ruch and Levin also found that experimenter-provided repetitions facilitated verbatim- though not paraphrase-cued information. These data are consistent with the interpretation that pictures lead to a more complete processing of story material in comparison to simple repetition, at least with normal children. In the present study, this interpretation was examined with respect to EMR children.

Method

Subjects

Ninety-six subjects (age range 10 years, 0 months to 16 years, 11 months) were taken from public school special education classes in Madison, Wisconsin. Subjects were divided into a group of 48 older ($\overline{CA}$ = 15.0 years; $\overline{IQ}$ = 69.4) and 48 younger ($\overline{CA}$ = 12.0 years; $\overline{IQ}$ = 72.3) children. All subjects had been classified as Educable Mentally Retarded by the school system and evinced no clinical abnormalities (neurological damage, severe sensory defects or physical stigmata).

Design and Materials

A 20-sentence, fictitious story was adapted from a longer story used by Pressley (1976). Each sentence was constructed such that it contained an item of information of a unique nature (e.g., a dog is holding a banjo) which could be requested with a single question. A colored, cartoon-like drawing was constructed for each of the 20 sentences depicting the events in the story.

A question was formulated to measure recall of information contained in each of the 20 sentences of the story. Each question was produced in two forms, verbatim (e.g., for the original sentence containing "a dog holding a banjo came running up to the gate", the verbatim question was "What was the dog holding as he ran up to the gate?" and the paraphrase question was "What was the hound carrying as he arrived at the entrance?").

In order to minimize the cumulative effects of the story sequence and avoid the possibility of penalizing subjects who could not answer a preceding question, most questions provided information sought in previous questions (Levin, 1973). All questions were read to a group of normal pilot subjects who had not heard the story. The failure of subjects in

this group to guess correct answers verified that information contained in the questions was not available via prior knowledge or associations.

Each subject was randomly assigned to one of four experimental conditions: Picture, where subjects viewed a picture while hearing each sentence of the story; Imagery, where subjects were instructed to generate a mental picture for each sentence of the story; Repetition Control, where subjects listened to each sentence twice in succession; and Control, where subjects listened to the entire story without pictures or special instructions.

A three-sentence practice story, along with instructions and props appropriate for the subject's condition, was given, followed by sample questions. The practice story and questions were recorded on tape, as were the actual story and questions. For the actual story, one of two question orders was employed, with each order containing 10 verbatim and 10 paraphrase questions. Question types were randomly interspersed across the 20 questions, and reversed between orders.

Procedure

Subjects were tested individually in a room with only the experimenter present. All subjects were told initially that they were going to hear a story, and that afterward they would be asked to answer some questions about the story. Following thorough instructions and the practice story, subjects listened to the actual story. Subjects in the Imagery condition were reminded to image at three preselected spots during the story, so that performance failure could not be attributed to a simple "strategy discontinuance" explanation. Immediately after the story was completed,

the questions were played and the subject's responses recorded on an answer sheet by the experimenter. When testing was completed, each subject was asked not to tell his/her classmates about the story or testing activities.

Results

Each question was assigned a value of one point for scoring. Thus, the maximum score was 20 points, or 10 verbatim and 10 paraphrase points. Half-point credit was given for responses in which some but not all of the information was correct. Decisions determining the criteria for the assignment of zero-, half-, or whole-point scoring were based upon the judgments of two independent raters who were not informed of the experimental conditions in which the answers appeared.

Mean performance in each of the four conditions (expressed as percent correct) is presented in Table 1, separately for verbatim and paraphrase

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Insert Table 1 about here

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questions. For each question variation, 3 families of comparisons were conducted. First, the conditions effect was assessed on the basis of the 6 possible pairwise comparisons involving the 4 conditions. Second, these same 6 comparisons were examined in terms of their interaction with age (older vs. younger EMRs). Finally, the age main effect itself was evaluated. Thus, in all, 13 planned comparisons were conducted for each question variation. The Type I error rate (α) was set equal to .01 per comparison, yielding an experimentwise α of .13 or less per question variation (Kirk, 1968).

Since none of the comparisons involving age was significant, the data are discussed only in terms of the across-age conditions differences, as presented in Table 1. Consideration of the age variable will be given in the Discussion section.

As may be inferred from Table 1, subjects in the Picture condition performed better than subjects in each of the three other conditions. The differences were significant for both verbatim questions, all ts (90) > 3.52, ps < .01, and paraphrase questions, all ts (90) > 2.98, ps < .01. Moreover, no differences among the three other conditions were significant for either question variation, all $|t|$s < 1.51, ps > .10. Thus, the results are quite straightforward, with statistically comparable performance profiles produced by the two question variations.

Discussion

The effects of showing pictures to EMR children while they listen to a story are striking. The amount of facilitation observed in the Picture group--an average of 89% in comparison to the Control group--exceeds the improvement due to pictures typically found among normal children (see Pressley, in press). Moreover, since the effect was at least as striking on paraphrase questions as on verbatim questions, it may be assumed that the advantage of pictures is not limited to subjects' memory for surface-level phonological information. The provision of a pictorial adjunct to a population of inefficient learners increases the amount of information they are able to remember. Thus, the use of visual illustrations by special educators, in books as well as classroom aids, warrants continued investigation.

Of equal interest as the picture effects, but for other reasons, is the complete lack of facilitation due to either experimenter-provided repetitions or

visual imagery instructions. Concerning the former, in contrast to previous research with normal children (Levin et al., 1976; Ruch & Levin, in press), simply repeating each sentence of the story did not boost the present EMR children's performance. Thus, whatever mechanism is activated by repetition in normals (e.g., attention, rehearsal) was not activated here; or at least, it did not materialize in learning gains. This lack of facilitation due to repetition among both younger and older EMRs should be of some importance to researchers and practitioners in the special education field, since there appears to be scanty systematic data addressing this question in EMR populations (see Brown, 1974).

The failure of imagery instructions to improve recall is similarly interesting, and ties in directly with some recent developmental notions about imagery in prose-learning situations (e.g., Guttmann et al., in press; Lesgold et al., 1975). In this regard, it is difficult to attribute the failure to any unique characteristics of the present passage. First, although the particular story used here differed from those in previous experiments, it nonetheless conformed to Levin and Lesgold's (Note 1) specifications for enhancing the likelihood of obtaining picture and imagery effects in prose. Second, and more to the point, supplementary data collected on a sample of normal third graders did produce an Imagery-Control difference with the same passage.

Two other possible explanations of the imagery strategy's failure among EMRs may also be dismissed. First, it cannot be argued that subjects forgot to keep using the strategy since it will be remembered that 3 strategy prompts were provided by the experimenter throughout the passage. Neither can it be argued that they simply lost interest in applying the

strategy, since an analysis of performance on early and late portions of the story did not reveal any differential effects.

Thus, consistent with previous speculations about imagery on this task (Lesgold et al., 1975), it is assumed that the complex process of generating and regenerating images while keeping track of the theme and events of a story is too great a requirement for EMR children. This is in contrast to the simpler operation of generating discrete images for arbitrary pairs, something with which EMRs are successful (Yarmey & Bowen, 1972). Thus, it is not enough to ask whether or not retarded children can generate mental images or employ any other mediational strategy. The degree to which the retardate experiences a deficiency in his or her ability to employ such strategies varies with task characteristics, and "...the more that the nature of the task permits strategic behavior in learning, or requires complex learning, the greater the likelihood that brighter...nonretarded groups will outperform retarded groups by a wide margin" (Spitz, 1976, p. 49). It remains to be seen whether extended practice (e.g., Pressley, 1976) or training (e.g., Lesgold, McCormick & Golinkoff, 1975) can be employed to help EMR subjects learn to generate images while listening to a story. That they can do so on a paired-associate task (Yarmey & Bowen, 1972) and on a prose-learning task when the experimenter provides a picture for them to encode (the present results), strongly suggests that the foundation skills for effective imagery training are present.

Finally, the finding that the average performance of older EMRs (14 to 16 year olds) did not surpass that of younger EMRs (10 to 14 year olds), while potentially intriguing, must be interpreted with caution.[1] Any number of plausible hypotheses can be offered to account for this finding, although the available literature provides little confirmatory

evidence. Although it is possible that cognitive development between these two ages has been arrested for EMRs, in contrast to normals, a couple of artifactual variables must first be considered. For one, it can be argued that the criteria used to place children from this particular school district into EMR categories varied over time, and if present criteria are less stringent the younger children may be on the whole more able. Somewhat related to this is the likely possibility that with the current emphasis on "mainstreaming"--especially in the upper grades--the older children still categorized as EMR are comparatively worse off than the younger children. Such extraneous factors must be attended to before the notion of a developmental ceiling is accepted.

Reference Notes

1. Levin, J. R., & Lesgold, A. M. Do pictures improve children's prose learning? An examination of the evidence. Paper presented at the annual meeting of the National Reading Conference, New Orleans, December 1977.

2. Peng, C.-Y. The picture effect and its long-term impact on children's prose learning. Unpublished masters thesis, University of Wisconsin, Madison, 1977.

References

Anderson, R. C. How to construct achievement tests to assess comprehension. Review of Educational Research, 1972, 42, 145-170.

Brown, A. L. The role of strategic behavior in retardate memory. In N. R. Ellis (Ed.), International review of research in mental retardation (Vol. 7). New York: Academic Press, 1974.

Flavell, J. H. Developmental studies of mediated memory. In H. W. Reese & L. P. Lipsitt (Eds.), Advances in child development and behavior (Vol. 5). New York: Academic Press, 1970.

Guttmann, J., Levin, J. R., & Pressley, M. Pictures, partial pictures, and young children's oral prose learning. Journal of Educational Psychology, in press.

Kirk, R. E. Experimental design: Procedures for the behavioral sciences. Belmont, Calif.: Brooks/Cole, 1968.

Lesgold, A. M., Levin, J. R., Shimron, J., & Guttmann, J. Pictures and young children's learning from oral prose. Journal of Educational Psychology, 1975, 67, 636-642.

Lesgold, A. M., McCormick, C., & Golinkoff, R. M. Imagery training and children's prose learning. Journal of Educational Psychology, 1975, 67, 663-667.

Levin, J. R. What have we learned about maximizing what children learn? In J. R. Levin and V. L. Allen (Eds.), Cognitive learning in children: Theories and strategies. New York: Academic Press, 1976.

Levin, J. R. Inducing comprehension in poor readers: A test of a recent model. Journal of Educational Psychology, 1973, 65, 19-24.

Levin, J. R., Bender, B. G., & Lesgold, A. M. Pictures, repetition, and young children's oral prose learning. AV Communication Review, 1976, 24, 367-380.

Milgram, N. A., & Riedel, W. Verbal context and visual compound in paired-associate learning of mental retardates. American Journal of Mental Deficiency, 1969, 73, 755-761.

Pascual-Leone, J. A. A mathematical model for the transitional rule in Piaget's developmental stages. Acta Psychologica, 1970, 32, 301-345.

Pressley, G. M. Mental imagery helps eight-year-olds remember what they read. Journal of Educational Psychology, 1976, 68, 355-359.

Pressley, M. Imagery and children's learning: Putting the picture in developmental perspective. Review of Educational Research, in press.

Ruch, M. D., & Levin, J. R. Pictorial organization versus verbal repetition of children's prose: Evidence for processing differences. AV Communication Review, in press.

Shimron, J. Imagery and comprehension of prose by elementary school children. (Doctoral dissertation, University of Pittsburgh, 1974). Dissertation Abstracts International, 1975, 36, 795-A. (University Microfilms No. 75-18, 254.)

Spitz, H. H. Toward a relative psychology of mental retardation, with special emphasis on evolution. In N. R. Ellis (Ed.), International review of research in mental retardation (Vol. 8). New York: Academic Press, 1976.

Turnure, J. E., & Walsh, M. K. Extended verbal mediation in the learning and reversal of paired-associates by EMR children. American Journal of Mental Deficiency, 1971, 76, 60-67.

Yarmey, A. D., & Bowen, N. V. The role of imagery in incidental learning of educable retarded and normal children. Journal of Experimental Child Psychology, 1972, 14, 303-312.

Table 1

Mean Percent Correct in Each of the Four Conditions,

by Question Variation

Question Variation	Condition			
	Picture	Imagery	Repetition Control	Control
Verbatim	67.50	36.67	43.13	37.50
Paraphrase	59.79	33.33	40.00	30.00
Across Question Variations	63.64	35.00	41.56	33.75

Footnote

[1] It should be noted that an examination of the relationship between subjects' actual ages and recall in the Control condition (replacing the simpler older-younger distinction) leads to the same conclusion, since $\underline{r}$ = .14 across question variations.

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